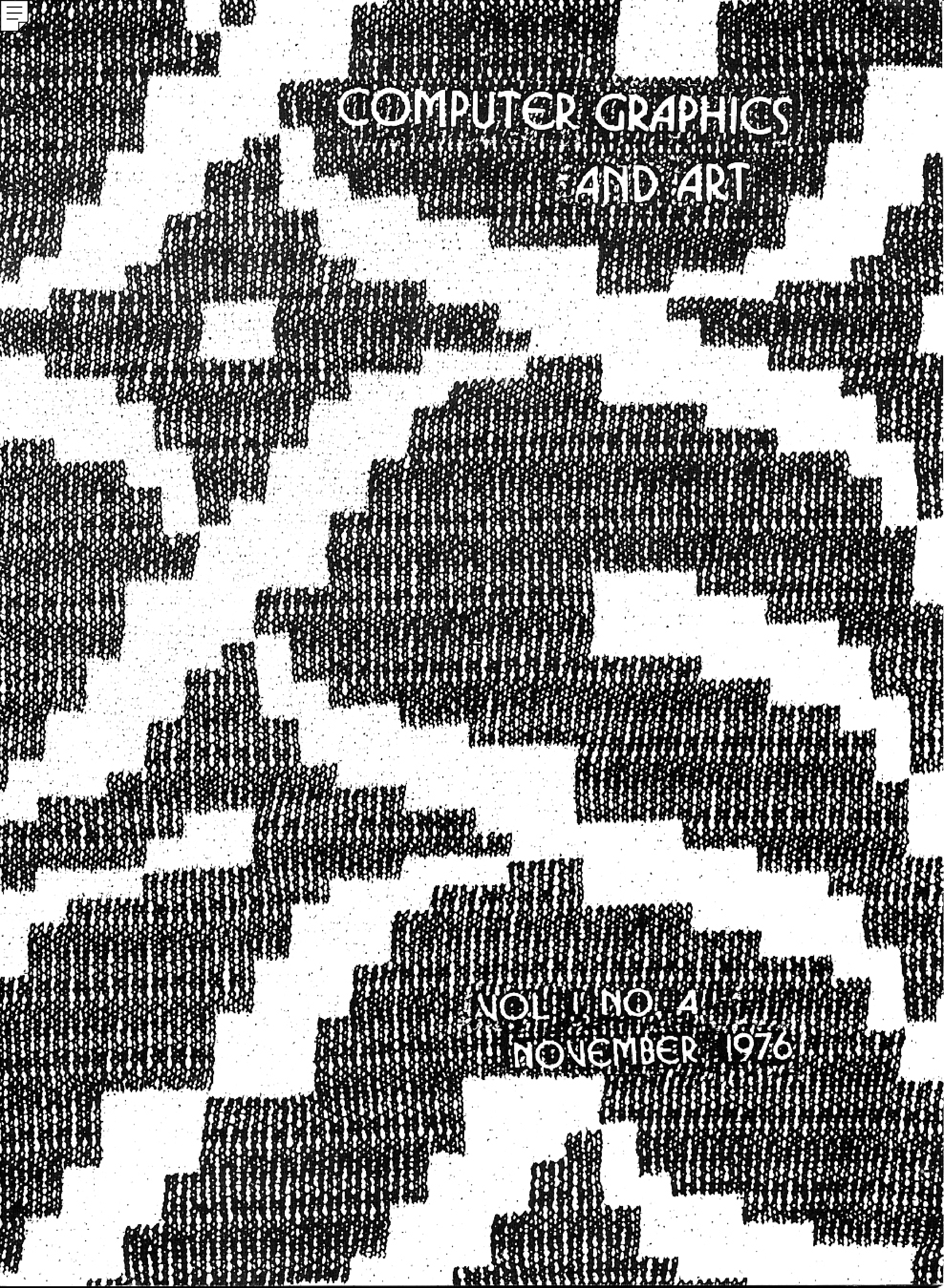
COMPUTER GRAPHICS
AND ART
VOL. I, NO. 4
NOVEMBER 1976

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COMPUTER GRAPHICS & ART is published quarterly, 4 issues per year. Printed in the U.S.A.

ANNUAL SUBSCRIPTION RATES
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THE MAGAZINE OF INTERDISCIPLINARY COMPUTER GRAPHICS FOR PROFESSIONAL GRAPHICS PEOPLE AND COMPUTER ARTISTS.

NOVEMBER THEME: APPLICATIONS

EDITORIAL

TO MEASURE, TO QUANTIFY, TO KNOW?

Recently a prominent simulation expert visited our campus as a distinguished visiting professor, giving a series of guest lectures for faculty and students. I had asked him to relate the importance of computer graphics to simulation -- in addition to emphasizing the significance of simulation in problem-solving.

In order to afford objective thinking about the topics and questions raised, I have marked his topics with quotation marks, preceded by VP (for Visiting Professor). I would add that his topics were well developed in a broad, significant manner, and that I am taking them as a departure place, to briefly explore the importance (or lack of importance of interdisciplinary—not art) computer graphics.

1. VP: "You might say that computer graphics could save the world. What does this mean?"

Computer graphics enhances communication. Visual displays have been used by man throughout history to convey information. Consider the text, Limits to Growth by Meadows, Randers, and Behrens, a well-known paperback. Study the innumerable graphs in this text. Could the data and results of this simulation be displayed in a more dramatic and communicative way? Decidedly, "No." To accomplish these graphs manually would be tedious, imprecise, and unaesthetic. In essence, when computer graphing facilities are available, it is foolish (and perhaps passé) not to visualize computer processing via computer graphics. Processing of alpha-numeric data without visual displays is mere partial processing that does not display nor communicate results to the viewer or reader.

2. VP: "Many of the major and minor problems of the world can be solved by enhanced communication."

Computer graphics convey information objectively, dramatically, without emotional, subjective overtones often conveyed by numbers and words. Words too often are generalistic, colored by overuse, personal interpretations — imprecise. Numbers convey more precise information, but they do not fully reveal relationships and results. Graphics afford a fuller, more enhanced, more understandable projection of the subject — and communication is enhanced.

Let us look at this word "communication." If I may use computer terminology, to me, when an idea is communicated, it is throughput into the listener's (or reader's) consciousness, and processed by the receiver. Further, the material input and processed is not distorted, but conveyed in a manner that facilitates a lack of distortion, assuring maximum human comprehension.

Agreed: Enhanced communication between people can contribute to solving many of the major and minor problems of the world. In addition, enhanced communication will allow people of diverse attitudes and capacities to work together more amicably to do important tasks needed in today's complex world.

3. VP: "Simulation and visual displays are not new to man. Often simulation and visual portrayal of information allows man to cogitate about the problem, and sometimes, to solve the problem without computer processing."

Man has been formulating and visualizing symbols to communicate more precise meanings to other men since prehistory. (The excellent, edited version of James Beniger's lengthy article, "From Stylus to Light Pen: Technology and Innovation in the Development of Quantitative Graphics" reveals man's persistent efforts to portray information to other people. The techniques of conveying varied information (pictures, words, mathematics, natural and synthetic languages) offer neutral methods of communicating to other people important ideas. Simulation allows us to explore innumerable alternatives and relationships, to perceive the results of varied options, manipulations of complex variables and their interdependent interrelationships. Simulation and visualization of processes can enhance and upgrade decision-making. If we truly "cogitate" about our problems, we are in a better position to solve them.

4. GCH: "Are the problems we are simulating and processing important? Are they trivial? Are technical persons concerned with the importance or lack of importance of the material being processed by them?"

Page 24 of Limits to Growth reveals Figure 1, titled "Human Perspectives." This matrix of self, related to other selves, in time and space, is one of the most important tables I have ever seen. It graphs a person's placement in Space on the Y axis, and placement in Time on the X axis. SPACE: my family, neighborhood, race, nation...the world. TIME: next week, next few years, my lifetime, my children's lifetime...

5. GCH: "Are we wise enough, concerned enough to consider what we are processing and visualizing?"

Much processing of information is invaluable, an aid to thinking and decision-making. Yet the subject, the approach, and the programs depend upon the originator. The attitudes, concerns, and gifts of the originator determine the outcomes. This is true in computer graphics also.

The computer's most important gift to us is the capacity to cogitate, to study, to reason, to measure, and perhaps to meditate.

Yet when man measures, quantifies, graphs, does he "know" and understand? Where are our limits?

Computer usage and graphics visialization reveals our own limits, our own growth, but posits or places upon our individual shoulders, the predicament of mankind, and the solution to the major and minor problems of the world.

(Editor)

COMPUTER GRAPHICS AT THE UNIVERSITY OF MUNICH (WEST GERMANY)

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"This is a report of the first computer graphics course for students of art at the University of Munich...A further objective to be realized was for every student to be able to generate esthetically appealing computer graphics after only the first lecture period."

INTRODUCTION

In the summer semester at the Universitat Munchen a course in the programming of computer graphics was carried out by the author in connection with a teaching commission under the Department of Art (Professor Hans Daucher).

Although the participants possessed no special technical skills or experience whatever in programming, the theoretical aspects of computer graphics and the computer arts were already known to them, since a course in Cybernetic Esthetics was regularly held in the same department by Dr. Herbert W. Franke.

An important factor was that only truly interested students registered for the course, and these students consequently participated in these sessions until the end without interruptions. The lecture met once weekly for two hours and consisted of ten instructional units. The duration of the course was set at approximately four months.

CONCEPTION AND OBJECTIVES

In the conception of the course, it was taken into consideration that none of the students had ever come in contact with the facilities of an Electronic Data Processing Center, and that only knowledge in basic mathematics, learned at the gymnasium was to be expected. Some difficulties were anticipated, since all the work could be carried on locally at the Computer Center, some ten kilometers distant from the instructional site.

The participants were expected to carry out their exercises independently, as no instructors were available during the periods between the course lectures, which met once weekly.

A further objective (and difficulty) was for every student to be able to generate esthetically appealing computer graphics after only the first lecture period.

AVAILABLE GRAPHICS SOFTWARE

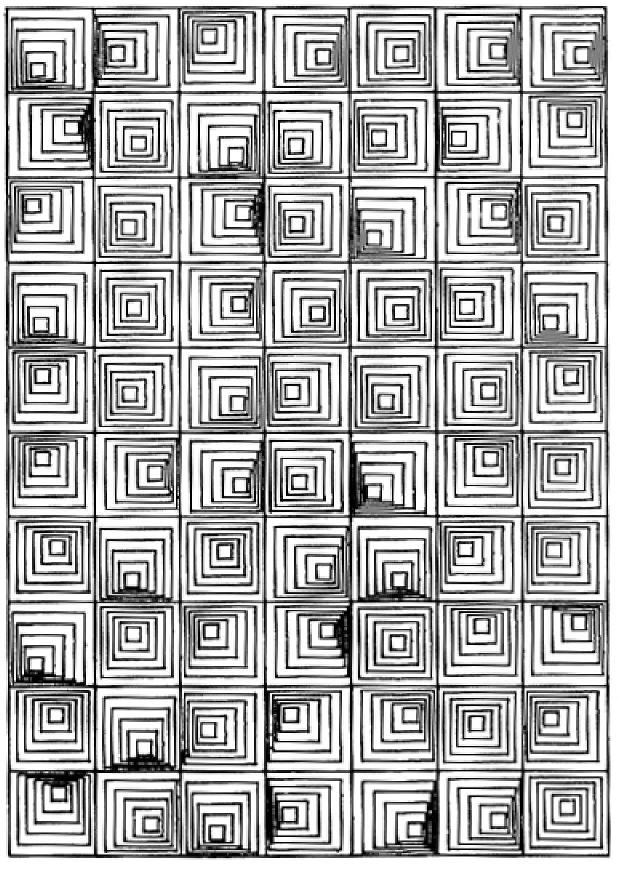
The graphics system from the Computer Center proved to be unsuitable for our purposes, since it employed a higher level program language (FORTRAN IV, ALGOL 50) — and to conduct lessons for art students in these languages would have been too exacting for them. The possibility was to develop an interface between the graphics system and the available BASIC Compilter Interpreter, creating an opportunity of treating the graphics software in the more simple BASIC language. This would not have changed the fact that a programming language would have to be learned from the beginning, but it would allow use of a programming language that was more suited to the artists' programmatic capacities.

GRAPHICS SYSTEM SNE COMP ART 76

In order to produce computer graphics demanding minimal programming knowledge, module technology was employed. Individual modules were chosen according to desired graph designs and skills of the users. The corresponding information was input into the computer through punched cards.

The input modules can therefore be temporarily modified by adding subroutines, thus creating unique program components (such as loops and dynamic parameter variations).

Figure 4 (BELOW) — SEE DESCRIPTION AT RIGHT.



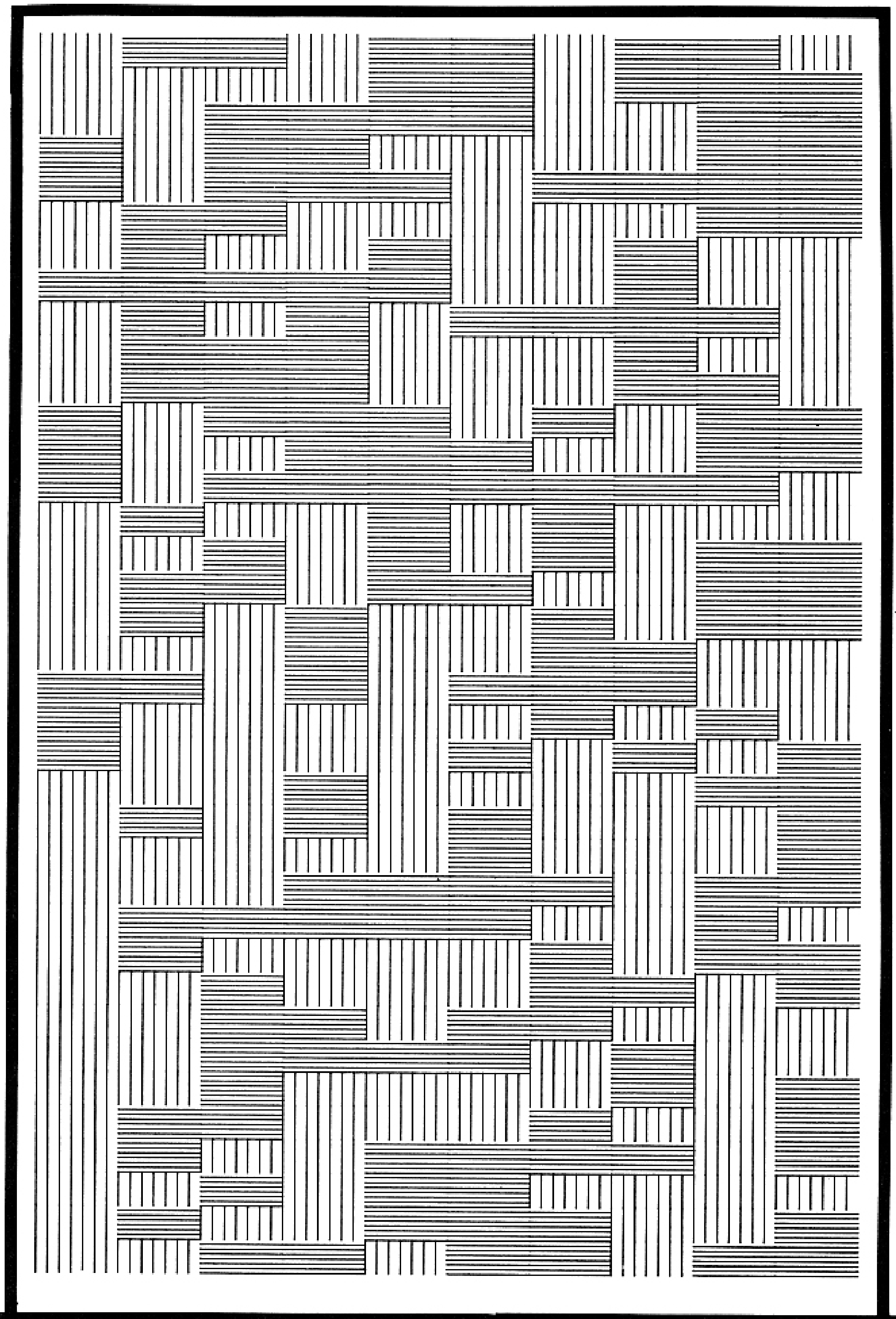


Figure 4 (OPPOSITE PAGE AT LEFT)

This picture was generated by the student of R. Stoiber. The middle point M(M1,M2) of each square was ascertained by chance.

M1 = SNERAD (A1,B1)
M2 = SNERAD (A2,B2)

SNERAD gives a probability value between A1, B1 and A2, B2 respectively, which pertain to M1, M2 respectively.

Figure 1 (ABOVE)

The program consists of three call orders:

1. Size of the sheet of paper.
2. A scale distortion of 1:2 in one direction.
3. The routine SNEKAO with eight parameters.

The routine SNEKAO proves here two elements: 1. ≡ 2. ||||. These squares occur in a random order. The scale distortion of 1:2 stretches the elements in on one direction to produce graying effects.

In the design of the system that we called SNE COMP ART 76, particular emphasis was placed upon the gradual transition from the use of pure modules (Figure 1) to genuine BASIC programming (Figure 2). The individual modules of the graphics system SNE COMP ART 76 can be dynamically controlled with minimal expertise (Figure 3) on the part of the user.

Moreover, additional external coincidence generators (random numbers) can be coupled to the individual modules (Figure 4).

At present, the graphics language comprises approximately ten complex modules (SNEKAO) and several function modules (SNERAD).

The dependence of command cards for winding up the individual system operations could be greatly reduced or completely eliminated with the help of internal sequence command calls.

DIDACTIC ASPECTS

The main purpose of the course was to enable the participants to create their own computer graphics. Individual base modules of the graphic language SNE COMP ART 76 are presented, which fulfill this purpose. Modules of increasing complexity were gradually employed, which provided a dynamic internal control of the individual subroutine parameters. In this way the first transition to the programming level was realized.

As the next step temporary variations of the individual submodules were described. So-called function modules, such as SNERAD (Figure 4) are used as additional aids. In this manner the step to pure programming was taken, by application of the two primary orders MOVETO and DRAWTO (Figure 2).

It was found that the concept of advancing from the complex modules to BASIC programming is an excellent method of introducing art students to practical computer graphics.

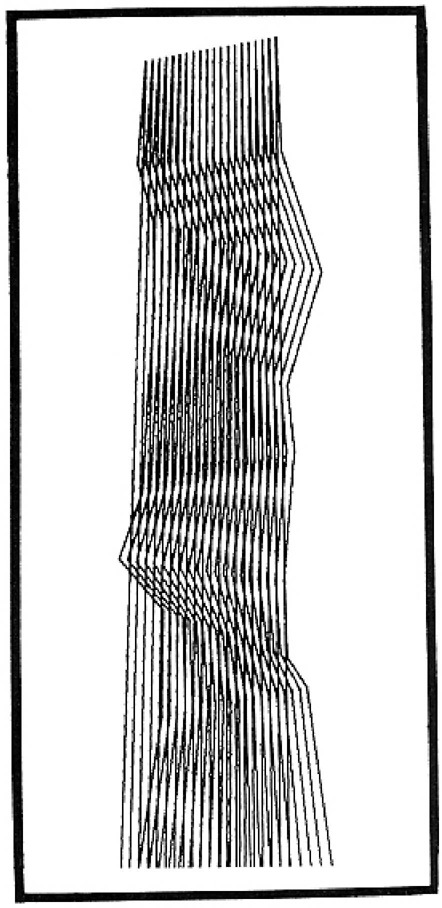
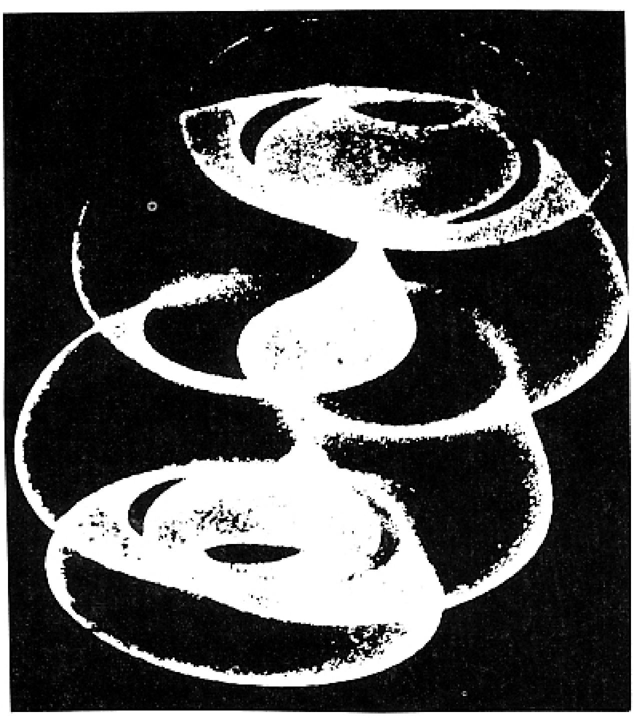


Figure 2 (ABOVE) - An example of BASIC programming by a student.



AT LEFT, BELOW - A silk-screened graphic by Herbert Franke. The original work was displayed on a cathode ray tube, and in the photographic development process, a coarse-grained screen was utilized to achieve a new look in CRT graphics. (See references for details.)

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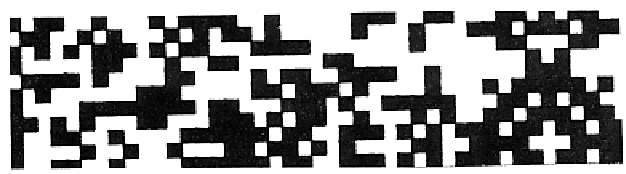

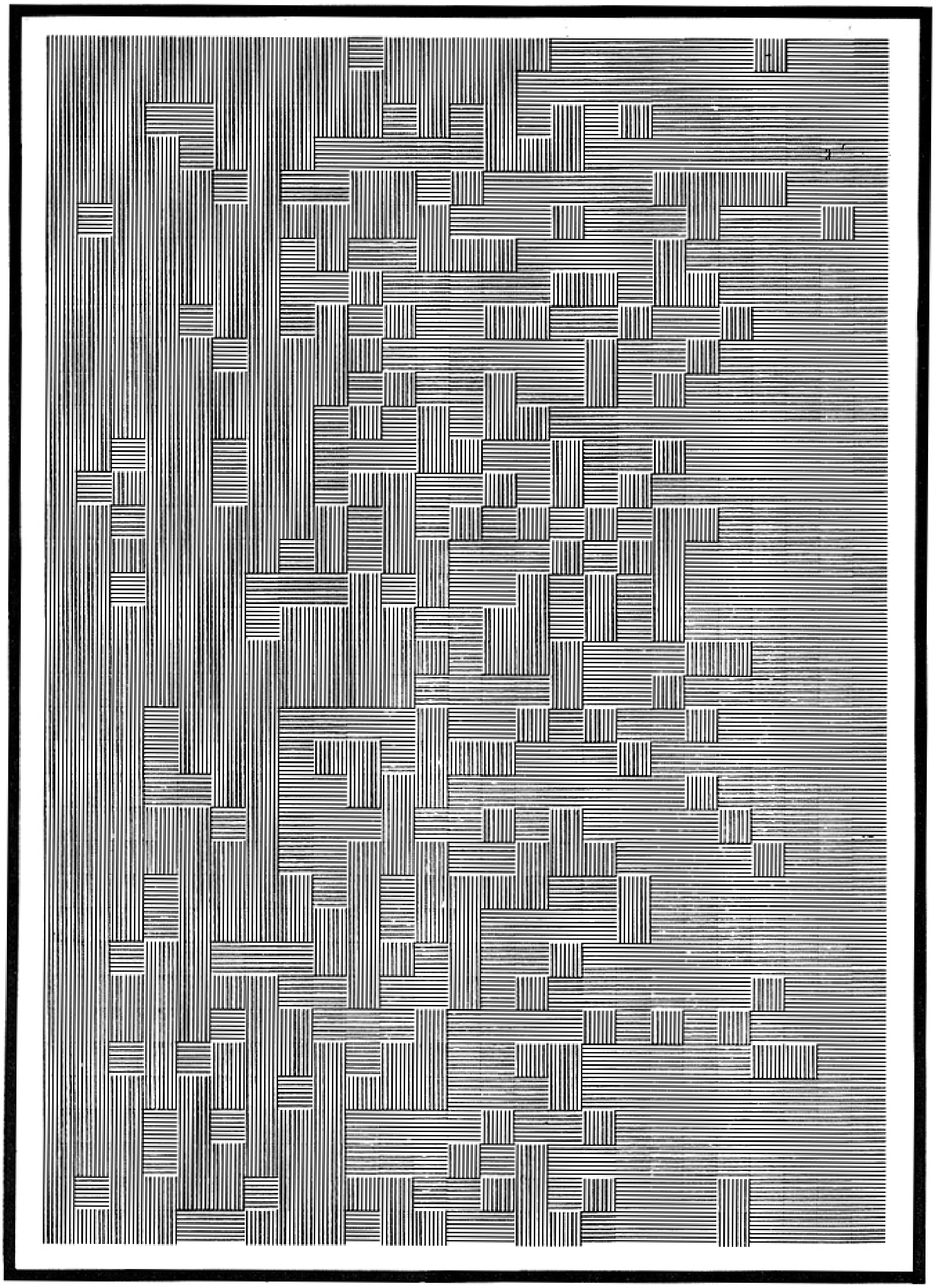

Figure 3 (ABOVE) - The routine SNEKAO is called once for each column, so that the proportion of horizontal and vertical elements per column is delivered in the form of two parameters. The employment of a programming loop here is particularly elegant. The graphic is an excellent example of the type of work produced by students in their first course at the Universitat.

NOTE: For readers desiring additional material on the teaching of computer art, see the Spring Bibliography Issues of Computers and the Humanities Magazine for definitive references on the Computer Visual Arts.

Added material is also given in the abstracts of the Biennial International Conferences of Computers and the Humanities. (See the Table of Contents for the announcement on the 1977 International Conference.)